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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/590,127	10/13/2006	Takashi Ogawa	S005-5850 (PCT)	4057

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EXAMINER

PURINTON, BROOKE J

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/590,127	Applicant(s) OGAWA, TAKASHI	
	Examiner Brooke Purinton	Art Unit 2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 January 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 9-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 9-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 8/18/2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 9, 13 are rejected under 35 U.S.C. 102(b) as being taught by Uehara, et al. (JP 06082507A).

Regarding Claim 1, Uehara teaches a semiconductor inspection method, characterized by comprising: microscopically observing and analyzing both the state of a sample surface which is irradiated by an electron beam or a positively charged ion beam to charge the sample surface, and the change in contrast (determines whether it is conducting or non-conducting due to voltage drop/change in contrast as described in constitution) of an area of the sample surface in a highly charged state when the area (i.e. the “wiring pattern” in the constitution) in a highly charged state is irradiated with an oppositely charged ion beam or an electron beam (purpose).

Regarding Claim 9, Uehara teaches a semiconductor inspection method comprising: a first step of irradiating a predetermined area of a sample surface of a semiconductor device on which a wiring pattern is formed with a first charged particle beam to charge the predetermined area (“electron beam” of purpose); and a second step of irradiating a second charged particle beam charged oppositely to the first charged particles (“positive ion beam” of purpose), a highly charged desired pattern of the charged predetermined charged area, characterized in that wherein the change in the contrast on the sample surface after the second step from the time of the first step is observed by a microscope using the first charged particle beam (Figures 2-4, part 3, electron detector).

Regarding Claim 13, Uehara teaches a semiconductor inspection method according to claim 1; wherein the analyzing is performed by comparing the change in the contrast of an area in a highly charged state with that of a standard sample (“discrimination can be made between conducting and

Art Unit: 2881

nonconducting" based on what is expected for a conducting wiring patter, and what is seen (i.e. when it is not the expected result).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2,10-12,14-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uehara et al. and further in view of Patterson et al. (20050068502)

Regarding Claim 14, Uehara teaches a semiconductor inspection method using a composite apparatus including both a first charged particle beam apparatus for scanning a first charged particle beam and a second charged particle beam apparatus for scanning a second charged particle beam, the second charged particle beam being charged oppositely to the first charged particle beam, comprising: a first step for charging a sample surface by irradiating the first charged particle beam on the sample surface (purpose, electron beam) a third step for irradiating the second charged particle beam on a selected target area of the area in a highly charged state of the charged sample surface (purpose, positive ion beam); and a fourth step for observing a contrast change of the target area while the target area is being irradiated in the third step (purpose, detecting emitted electrons).

Uehara fails to explicitly teach a second step for observing an area in a highly charged state of the charged sample surface with the first charged particle beam apparatus.

Patterson teaches a step for observing an area of the sample surface with the first charged particle beam apparatus ([30]).

Modification would have entailed using the method of Patterson in order to inspect the sample before the second charged particle beam irradiates the sample.

Modification would have been obvious since Patterson uses the inspection process to find areas to inspect. It would have been a desirable benefit to find an area to inspect using the tools available, such as

Art Unit: 2881

the SEM already disclosed, since just trying to inspect places on the wafer randomly would not be efficient.

Regarding Claim 21, Uehara teaches a method of inspecting a sample using a composite apparatus a first charged particle beam apparatus for scanning a first charged particle beam and a second charged particle beam apparatus for scanning a second charged particle beam, the second charged particle beam being charged oppositely to the first charged particle beam, the method comprising the steps: irradiating the sample with the first charged particle beam to charge the sample surface; (purpose, electron beam) irradiating the target area of the charged sample surface with the second charged particle beam to cause the target area to undergo a change in voltage contrast (purpose, positive ion beam); and observing an image of the target area of the sample surface using the first charged particle beam apparatus to observe the voltage contrast change while the target area is being irradiated with the second charged particle beam (potential drop/potential rise in constitution).

Uehara fails to explicitly teach observing an image of the charged sample surface using the first charged particle beam apparatus and selecting a target area on the charged sample surface from the image.

Patterson teaches observing an image of the charged sample surface using the first charged particle beam apparatus and selecting a target area on the charged sample surface from the image ([30]).

Modification would have entailed using the method of Patterson in order to inspect the sample before the second charged particle beam irradiates the sample and select a target area.

Modification would have been obvious since Patterson uses the inspection process to find areas to inspect. It would have been a desirable benefit to find an area to inspect using the tools available, such as the SEM already disclosed, since just trying to inspect places on the wafer randomly would not be efficient.

Uehara also fails to explicitly state placing the sample in a vacuum chamber and irradiating with the beams while in a vacuum.

Patterson teaches placing a sample in a vacuum chamber and irradiating with the beams while in a vacuum ([32]).

Art Unit: 2881

Modification would have entailed using a vacuum chamber with the apparatus or method of Uehara.

It would have been obvious to make such a modification since it would allow less interference with the electron or ion beam functioning.

Regarding Claim 2, Uehara teaches a semiconductor inspection method according to claim 1, wherein the sample is irradiated with an electron beam to negatively charge the sample (purpose “electron beam”) the sample is spot- irradiated with a positively charged ion beam (purpose, “positive ion beam”), and reversal of contrast of the positively charged area relative to the sample surface is observed with e~ the SEM (Figure 2-4, secondary electron detector 3).

Uehara fails to teach that the sample is observed by an SEM.

Patterson teaches observing an image of the charged sample surface using the first charged particle beam apparatus and selecting a target area on the charged sample surface from the image ([30]).

Modification would have entailed using the method of Patterson in order to inspect the sample before the second charged particle beam irradiates the sample and select a target area.

Modification would have been obvious since Patterson uses the inspection process to find areas to inspect. It would have been a desirable benefit to find an area to inspect using the tools available, such as the SEM already disclosed, since just trying to inspect places on the wafer randomly would not be efficient.

Regarding Claims 10, 19, 24 Uehara/Uehara and Patterson teaches a semiconductor inspection method according to claim 2/16/23.

Uehara fails to teach wherein the acceleration voltage of the ion beam is set at a low acceleration of 10 kV or less.

Patterson teaches wherein the acceleration voltage of the ion beam is about 2.5kV (Claims 3 and 5).

Modification would have entailed using the voltage of the ion beam disclosed by Patterson in the invention of Uehara.

Art Unit: 2881

It would have been obvious to one of ordinary skill in the art at the time of the invention to make such a modification since it would have been obvious to one of ordinary skill in the art at the time of the invention to start with the disclosed value of an ion beam used for approximately the same purpose, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding Claims 11, 20, 26 Uehara/Uehara and Patterson teaches a semiconductor inspection method according to claim 3/17/25.

Uehara fails to teach wherein the acceleration voltage of the ion beam is set at a low acceleration of 10 kV or less.

Patterson teaches wherein the acceleration voltage of the ion beam is about 2.5kV (Claims 3 and 5).

Modification would have entailed using the voltage of the ion beam disclosed by Patterson in the invention of Uehara.

It would have been obvious to one of ordinary skill in the art at the time of the invention to make such a modification since it would have been obvious to one of ordinary skill in the art at the time of the invention to start with the disclosed value of an ion beam used for approximately the same purpose, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding Claim 12, 18, 27, Uehara teaches the semiconductor inspection method according to claim 2/14/21.

Uehara fails to teach wherein the spot-irradiating ion beam is a beam of intermittent pulses with a predetermined amount of charge and the amount of charge on the spot-irradiated area is determined by the number of pulses.

Patterson teaches wherein the spot-irradiating ion beam is a beam of intermittent pulses with a predetermined amount of charge and the amount of charge on the spot-irradiated area is determined by the number of pulses ([11]).

Art Unit: 2881

Modification would have entailed pulsing the beam of Uehara in the same manner.

It would have been obvious to make such a modification since Patterson teaches that “to avoid interference between the beams, the alternating pulsating sequencing of the two beams is necessary” [11] even though Patterson, like Uehara is checking to see if the wiring is connected, the two beams will interfere.

Regarding Claim 15/22, Uehara and Patterson teach a semiconductor inspection method according to claim 14/21.

Uehara teaches it further comprising a fifth step for observing an area where a contrast changes as the contrast of the target area changes and verifying continuity of wiring or the presence or absence of a defect between the area and the target area (in constitution “discrimination can be made between conduction and nonconduction”).

Regarding Claim 16, Uehara and Patterson detail a semiconductor inspection method according to claim 14. Uehara further teaches wherein the first charged particle beam is an electron beam and the second charged particle beam is a positively charged ion beam (purpose).

Regarding Claim 23, Uehara and Patterson teach a method according to claim 21. Uehara further teaches wherein the first charged particle beam is an electron beam and the second charged particle beam is a positively charged ion beam (purpose).

Regarding Claim 25, 17, Uehara and Patterson teach the method according to claim 14/21.

Uehara further teaches wherein the two beams are oppositely charged.

He fails to teach that the first charged particle beam is a positively charged ion beam and the second charged particle beam is an electron beam.

However, it would have been obvious to one of ordinary skill in the art to use either of the beams since it would create the same effect of charging the surface and making evident the voltage contrast between conducting or nonconducting elements. Since the functionality would still be present, regardless of whether the positive or the negative beam is irradiated to the sample firstly, it would be an obvious embodiment to one of ordinary skill in the art.

Art Unit: 2881

Regarding Claims 11, 20, 26 Uehara/Uehara and Patterson teaches a semiconductor inspection method according to claim 3/17/25.

Uehara fails to teach wherein the acceleration voltage of the ion beam is set at a low acceleration of 10 kV or less.

Patterson teaches wherein the acceleration voltage of the ion beam is about 2.5kV (Claims 3 and 5).

Modification would have entailed using the voltage of the ion beam disclosed by Patterson in the invention of Uehara.

It would have been obvious to one of ordinary skill in the art at the time of the invention to make such a modification since it would have been obvious to one of ordinary skill in the art at the time of the invention to start with the disclosed value of an ion beam used for approximately the same purpose, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uehara as applied to claim 1 above, and further in view of Hirose et al (20020017619).

Regarding Claim 3, Uehara teaches a semiconductor inspection method according to claim 1; wherein the sample is irradiated with a positively charged ion beam to positively charge the sample, the sample is observed by an FIB, the sample is spot-irradiated by a negatively charged electron beam, and reversal of contrast of the negatively charged area relative to the sample surface is observed with a FIB.

Uehara fails to teach that the sample is observed by a FIB.

Hirose et al. teach a sample observed by a FIB (SIM, abstract).

Modification would have entailed using the FIB of the Uehara invention to observe the surface of the sample.

It would have been obvious to one of ordinary skill to make such a modification since observing the sample using the ion beam would be known in the art to do, and would have been efficient if the beam was already ready to be used, was more reliable than the electron beam, took less energy than the electron beam, was easier to navigate or was closer, etc.

Art Unit: 2881

Ueharah fails to teach observing an image of the charged sample surface using the first charged particle beam apparatus and selecting a target area on the charged sample surface from the image

Patterson teaches observing an image of the charged sample surface using the first charged particle beam apparatus and selecting a target area on the charged sample surface from the image ([30]).

Modification would have entailed using the method of Patterson in order to inspect the sample before the second charged particle beam irradiates the sample and select a target area.

Modification would have been obvious since Patterson uses the inspection process to find areas to inspect. It would have been a desirable benefit to find an area to inspect using the tools available, such as the SEM already disclosed, since just trying to inspect places on the wafer randomly would not be efficient.

Response to Arguments

Applicant's arguments filed 1/16/2009, with respect to the provisional obviousness type double patenting rejection have been fully considered and are persuasive. The obviousness type double patenting rejection of the claims has been withdrawn.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Art Unit: 2881

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brooke Purinton whose telephone number is 571.270.5384. The examiner can normally be reached on Monday - Friday 7h30-5h00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on 571.272.2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David A Vanore/
Primary Examiner, Art Unit 2881

Brooke Purinton
Examiner
Art Unit 2881
/B. P./
Examiner, Art Unit 2881